

What is Claimed:

1. A method of cleaning the atmosphere either by catalytically treating the atmosphere to convert atmospheric pollutants to less harmful materials or by adsorbing pollutants contained in the atmosphere comprising contacting the pollutant containing atmosphere with an outer surface of a substrate which has been coated with either a catalyst composition to render said surface capable of catalytically converting said atmospheric pollutants into less harmful materials or an adsorptive composition in order to render said surface capable of adsorbing said atmosphere components and protecting the catalyst and/or adsorbent coated surface with an overcoat of at least one porous protective material which is sufficiently porous to enable said atmospheric containing said pollutants to pass therethrough into operative contact with the catalyst and/or adsorbent composition and which is sufficiently protective to prevent harmful contaminants from contacting the catalyst and/or adsorbent composition.

2. A method of cleaning the atmosphere by catalytically treating the atmosphere to convert atmospheric pollutants to less harmful materials comprising contacting the pollutant containing atmosphere with an outer surface of a substrate which has been coated with a catalyst composition to render said surface capable of catalytically converting said atmospheric pollutants into less harmful materials and protecting the catalyst coated surface with an overcoat of at least one porous protective material which is sufficiently porous to enable said atmospheric containing said pollutants to pass therethrough into operative contact with the catalyst composition and sufficiently protective to prevent harmful contaminants from contacting the catalyst composition.

3. The method of claim 2 further comprising coating the porous protective material overcoated catalytic surface with at least one hydrophobic protective substance which is capable of substantially

preventing liquid water and/or water vapor from reaching the catalyst composition.

4. The method of claim 2 comprising catalytically treating the atmosphere at temperatures of from about 0°-to about 150°C.

5 5. The method of claim 2 wherein the catalyst composition comprises base metals, precious metals as well as salts and oxides thereof and combinations thereof.

6. The method of claim 2 wherein the catalyst composition comprises manganese dioxide.

10 7. The method of claim 2 wherein the porous protective material is selected from the group consisting of zeolites, clays, alumina, silica, alkaline earth oxides, rare earth oxides, carbon and inert metal oxides and mixtures thereof.

15 8. The method of claim 7 wherein the porous protective material is silica containing high surface area alumina.

9. The method of claim 3 wherein the hydrophobic substance is selected from the group comprising fluoropolymers and silicone polymers.

20 10. A device for cleaning the atmosphere by catalytically treating the atmosphere to convert atmospheric pollutants to harmless byproducts comprising:

a) a substrate having a surface;  
b) a catalyst composition coated on said surface; and  
c) at least one porous protective material coated over the catalyst composition, said porous protective material being sufficiently  
25 porous to enable said atmosphere containing pollutants to pass therethrough into operative contact with the catalyst composition and sufficiently adsorbent to prevent harmful contaminants from contacting the catalyst composition.

30 11. The device of claim 10 further comprising at least one hydrophobic protective material overcoating the porous protective material

which is capable of substantially preventing liquid water and/or water vapor from reaching the catalyst composition.

12. The device of claim 10 comprising at least one layer of a protective material over the catalyst composition.

5 13. The device of claim 11 comprising at least one layer of the porous protective material and at least one layer of the hydrophobic protective material coated over the catalyst composition.

14. The device of claim 13 wherein at least one layer containing the hydrophobic protective material is between the layer of porous protective material and the catalyst composition.

15. The device of claim 10 wherein the catalyst composition comprises base metals, precious metals as well as salts and oxides thereof and combinations thereof.

16. The device of claim 10 wherein the catalyst composition comprises manganese dioxide.

17. The device of claim 10 wherein the porous protective material and the hydrophobic protective material are contained within at least one single layer.

18. The device of claim 10 wherein the porous protective material is selected from the group consisting of zeolites, clays, alumina, silica, alkaline earth oxides, rare earth oxides, carbon and inert metal oxides.

19. The device of claim 10 wherein the porous protective material is chosen from alumina or a silica containing high surface area alumina.

20. The device of claim 10 wherein the porous protective material is alumina and the catalyst composition comprises manganese dioxide.

21. The device of claim 10 wherein the pollutants to be treated are selected from the group comprising ozone, hydrocarbons, carbon monoxide and mixtures thereof.

22. The device of claim 11 wherein the hydrophobic protective material is selected from the group consisting of fluoropolymers and silicone.

23. A method of cleaning the atmosphere by adsorbing pollutants contained in the atmosphere comprising contacting the pollutant containing atmosphere with an outer surface of a substrate which has been coated with an adsorptive material to render said surface capable of adsorbing said atmospheric pollutants and protecting the adsorptive material coated surface with an overcoat of at least one porous protective material which is sufficiently porous to enable said atmosphere containing said pollutants to pass therethrough into operative contact with the adsorptive material and sufficiently protective to prevent harmful contaminants from contacting the adsorptive material.

24. The method of claim 23 further comprising coating the porous protective material overcoated surface with at least one hydrophobic protective substance which is capable of substantially preventing liquid water and/or water vapor from reaching the adsorptive material.

25. The method of claim 23 wherein the adsorptive material is chosen from among zeolites, molecular sieves, carbon and Group IIA metal oxides.

26. The method of claim 23 wherein the adsorptive material is a zeolite.

27. The method of claim 26 wherein the zeolite is beta-zeolite.

28. The method of claim 23 wherein the porous protective material is selected from the group consisting of zeolites, clays, alumina, high surface area alumina silica, alkaline earth oxides, rare earth oxides, carbon and inert metal oxides and mixtures thereof.

29. The method of claim 24 wherein the hydrophobic substance is selected from the group comprising fluoropolymers and silicone polymers.

30. A device for cleaning the atmosphere comprising:

- a) a substrate having a surface;
- b) an adsorptive material coated on said surface; and

c) at least one porous protective material coated over the adsorptive material, said porous protective material being sufficiently porous to enable said atmosphere-containing pollutants to pass therethrough into operative contact with the adsorptive material and sufficiently protective to prevent harmful contaminants from contacting the adsorptive material.

31. The device of claim 30 further comprising at least one hydrophobic protective material overcoating the porous protective material which is capable of substantially preventing liquid water and/or water vapor from reaching the adsorptive material.

10 32. The device of claim 31 comprising at least one layer of the porous protective material and at least one layer of the hydrophobic protective material coated over the adsorptive material.

33. The device of claim 30 wherein the adsorptive material is selected from zeolites, molecular sieves, carbon and Group IIA metal oxides and combinations thereof.

15 34. The device of claim 30 wherein the adsorptive material is a zeolite.

35. The device of claim 30 wherein the porous protective material is selected from the group consisting of zeolites, clays, alumina, silica, alkaline earth oxides, rare earth oxides, carbon and inert metal oxides.

20 36. The device of claim 30 wherein the porous protective material is high surface area alumina.